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71 Applicant:

P & H Kunststoff-Recycling
GmbH & Co KG, 57319
Bad Berleburg, DE

72 Inventor:

Philipp, Klaus-Ulrich, 5920, Bad Berleburg, DE

74 Representative:

Bauer, W., Dipl.-Phys. Dr.
rer. nat., Patent Attorney
50968 Cologne

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54 Process for Preparing an Elastic Backing for Carpeting and Elastic Carpet Backing Prepared on the Basis of the Process

57 In the process for preparing an elastic backing for carpeting carpet waste is comminuted into portions with a length between two and thirty, preferably between five and fifteen millimeters. The decomposed material obtained in this way is mixed with a polyurethane binder and also preferably sprayed and the amount of polyurethane binder comes to 5 to 30 wt.-% of the portion of decomposed carpet waste and the mixture is compressed into a body during setting.

The following data are taken from information supplied by the applicant.

Description

The invention refers to a process for preparing an elastic backing for a carpet as well as to a carpet backing prepared based on this process.

In the preparing of carpeting waste occurs, especially by trimming on the end and side as well as by specimen production, defective production or the like. Large amounts of carpeting also occur, however during the tearing up of installed carpeting whether it is a case of installing new carpeting, making other types of flooring possible or for some other reason. The goal of the invention is to process such wastes further into a saleable product, therefore reconditioning and recycling it.

Here the term carpet(ing) is intended to mean carpet-carpeting [wall-to-wall] of any type, therefore the term also comprises carpet squares/tiles. Carpeting is manufactured especially as tufting [German word] or tufting [English word]. These latter obtain their closed or later cut web by drawing loops into the knit support cloth. In order to fasten the web loops a bonding agent, for example latex, is applied on the backside. In addition to carpeting there are also, however, tufting carpets and woven carpets.

The invention now comes into play here. The object of the invention is to process and recycle carpet wastes of carpets of all types and one strives for the shortest possible transport paths.

According to the invention this problem is solved by a process for preparing an elastic backing for a carpet in which carpet waste is comminuted into parts with a length between two and thirty, preferably between five and fifteen millimeters, the decomposed material obtained in this way is mixed with a polyurethane binder and preferably also sprayed and the amount of polyurethane binder comes to 5 to 30 wt.-% of the amount of decomposed carpet waste and during setting the mixture is compressed into a body, as concerns devices, this problem is solved by a backing for carpets made of an elastic material which at least in part forms foam comprised of decomposed carpet waste with fiber lengths between two and thirty, preferably between five and fifteen millimeters and a polyurethane binder which in terms of weight is present in an amount of 5 to 30 wt.-% of the decomposed carpet waste.

The process of the invention and the backing prepared based on the invention for a carpet has the great advantage that the waste material is used in the same industry in which it also occurs. The amount of waste occurring during the preparing of carpets can be immediately reused in the same type of preparation for preparing carpets. Only old carpets which occur after removing installed carpets have to be transported to the reprocessing location.

The backing on which the invention is based is optimally adapted for the given application; by increasing the weight per unit volume the impact sound attenuation can be increased and for the most part also the resistance to tearing. By increasing the thickness and especially also the enclosed air volume the thermal insulation can be improved. Usually no high stresses can be put on the resistance to tearing because these latter are assumed to exist thanks to the actual structure of the carpet, especially thanks to knit support fabric or knit support cloth. For example, by selecting long fibers, the way the straw was chopped and the like the resistance to tearing may also be adjusted, however, finally also by adding additional mineral fibers or coarse meal, for example.

According to the process, the diisocyanates and polyols forming the binder, as the main reaction partners, together with a solvent which promotes wetting, optionally with additional reaction agents are sprayed onto the scrap shreds located in a mixer which preferably operates chargewise. As to polyurethane chemistry itself reference is made to the general standard literature, for example to the Kunststoff-Taschenbuch, 20th, edition, pages 393 through 397 and reference is also made to DE 17 20 059 C3. Also mentioned there are catalysts for the polymerization reaction, for the crosslinking and foaming, in addition blowing agents, foam stabilizers and even flame retardants.

As to the amount, sufficient urethane binder is added so that an adequate wetting of the carpet waste in the form of shreds is used. When there are large shreds and correspondingly smaller surfaces then smaller amounts of binding agent are sufficient, when the shreds are finer and when the material is even more capable of absorbing, one has to count on adding larger amounts.

The bodies prepared on the basis of the invention are either in the cylindrical shape and one then has to switch to flat material or it is immediately shaped into flat material in a calender. Its weight per unit volume lies between 300 and 1000 kg/cm^3. By making chips and also by means of additional additives the properties can be adjusted, for example the impact sound attenuation, thermal insulation or the like. Preferably rubber granulate comes under consideration as additive which preferably is present as scrap rubber granulate. Here lengthy rubber threads such as occur as coarse meal in the preparing of loops prove to be favorable. They bring about a solidification of the backing on which the invention is based, they increase their weight per unit volume and they consequently bring about an increase of the impact sound attenuation. By adding portions of cork the weight per unit volume can be reduced, the same thing may occur by adding comminuted waste foam.

It has proven to be especially advantageous always to have the available amount of thermoplastic material in the waste carpeting. The layer of carpet backings present as an orbital layer can be compressed by subsequent thermal pressing locally, for example in the form of a net or dotted pattern. The heating has to be carried out here until the thermoplastic portions soften. In places where compaction is done in this way the material has a relatively high strength, however it has lower material strength.

According to the process of the invention, one may add to the mixture of carpet waste and polyurethane binder particles of cork, foam stabilizers, flame retardants, pigment paste, fillers or the already-mentioned rubber granulate preferably come under consideration here as additives. During the addition of such supplemental materials the ratio of polyurethane binding agent to carpet waste remains standing, however additional polyurethane binding agent has to be added in order to include the additional materials. The additional materials my constitute up to 70%, preferably up to 50 wt.-% of the finished product.

Finally, it has turned out to be especially advantageous to coat the free surface of the backing based on the invention with a thin surface layer. Essentially its task is to cover up the structures of the backing of the invention optically and to bring about an even external appearance. A thin layer of polyurethane foam comes under consideration as surface layer, however, it may also be a colored layer or a layer of adhesion in which sand was embedded.

Additional advantages and features of the invention become clear from the remaining claims as well as the embodiments which are not intended to be limiting in the following description. These embodiments will be explained in greater detail with respect to the drawing.

In its one and only figure the drawing shows a basic representation of a production process for a carpet backing.

From a supply bunker 20 filled partly with large-format carpet backing scrap 22, this latter is placed into a shredder 24 and there it is cut into larger individual pieces. The shredded material is fed into a silo 26, from there it is removed as needed and introduced into a mill 28 which breaks down (chops up, cuts up) the fragmented carpet residues. After mill 28 the chopped-up material has a maximum length of 15 mm, the thickness and width are less than 3 mm. The material is essentially longitudinal, therefore in the shredded form. By means of conveyance which uses a stream of air, driven by a blower 30 the cut pieces, also called granulated raw material, are fed into supply bunker 32. Two additional supply bunkers are provided, a supply bunker 34 for a polyurethane binder and a supply bunker for a second, granulated material, for example cork or granulated rubber 36.

On the outside the three supply bunkers 32 through 36 are connected to a mixing unit 38 on the outlet side which is located below them and which in the embodiment shown here is in the form of a plowshare mixer which operates charge by charge.

If a mono-component polyurethane material is present in supply bunker 34 for binder, then this latter can be fed directly into charger 38. However, if a two-component polyurethane binder is stored in supply bunker 34 then in each case the second component is fed from bunkers 40 which are arranged in supply bunkers 32 and 36 into connecting lines between these supply bunkers 32, 36 and mixer 38.

In the practical design the polyurethane binder is injected and indeed surrounded in the interior space of mixing unit 38 in a high-pressure process. If a polyol of the 3900 type is used, the binder is adjusted to the cold-soft foam. Additional additives may also be added, for example a pigment paste may be added to a storage bunker which is not shown.

The operation takes place charge by charge, however it is also possible to operate continuously. The mixture capable of being bonded, made up of cuts of carpeting and binding agent, drops from the outlet of mixing unit 38 to which, if necessary, a second granulated material may be added, for example cork, onto a conveyer belt 42 which is fed to various presses by means of weighing machine 44. On the left in the figure there is a mold 46 shown for cylinder production, the mixture capable of being bonded is charged into this mold and it is bonded under pressure. The extensively mold-bracing, elastic cylinder is then removed and peeling takes place by means of knives in a compounding unit 48, typical material thicknesses are between 3 and 7 mm.

In a different continuous processing an equipping takes place in the carousel process, three molds 50 are provided for this which may be fed by means of corresponding funnels. A subsequent processing may also take place by calendering.

In the following three examples are indicated for formulations:

Example 1

500 kg of decomposed carpeting-mixed waste and 500 kg of rubber granulate 1-3 are mixed with a dual-component polyurethane binding agent made up of 96 kg of polyol CP 4755 and 24 kg of Iso M 309. 3 kg of activators are added.

Example 2

This same mixture is used as in Example 1, however the type III granulate is replaced by coarse meal. The product obtained in this way is more rigid than the product based on Example 1.

Example 3

A solvent-free mono-component polyurethane binder with low viscosity which reacts by reaction with moisture (Sportelast 4252) in an amount of 40 kg is sprayed and mixed with 420 kg of carpeting-mixed waste, decomposed into pieces of 12 mm maximum length and otherwise maximum dimension of 2.5 mm by blanketing in the high-pressure process. The curing time in the presses which can be heated amounts to between 4 and 15 minutes.

All three formulations give an elastic product.

Claims

1. Process for preparing an elastic backing for carpets in which carpet scrap is comminuted into parts with a length between two and thirty, preferably five and fifteen millimeters, the decomposed material obtained in this way is mixed with a polyurethane binder and preferably also sprayed and the amount of polyurethane binder comes to 5 to 30 wt.-% of the amount of decomposed carpet waste and the mixture is compressed into a body during curing.

2. Process based on Claim 1, characterized by compressing the mixture of polyurethane binding agent and decomposed scrap carpeting into cylindrical bodies and by the fact that these cylindrical bodies are peeled off after curing has taken place in order to obtain a flat material in the shape of an orbit with a material thickness from 3 to 15 is obtained.

3. Process based on Claim 1, characterized by processing the mixture of polyurethane binder and decomposed carpet waste in a calender into flat material with a material thickness from two to fifteen millimeters.

4. Process based on one of Claims 1 through 3, characterized by additionally adding rubber granulate, preferably used rubber granulate and especially coarse meal from the processing of tires to the mixture of polyurethane binder and decomposed carpet waste before and/or during the curing phase and the rubber portion preferably amounts to a maximum of 70 wt.-% of the finished product, preferably at least 20 wt.-% in the finished product.

5. Process based on one of Claims 1 through 4, characterized by the carpet waste containing thermoplastic material, preferably at least 20 wt.-% thermoplastic material.

6. Process based on one of Claims 1 through 5, characterized by the decomposing of the carpet waste taking place in such a way that the decomposed material is essentially present in long, partial pieces whose length is at least four times greater, preferably at least 10 times greater than the width or thickness.

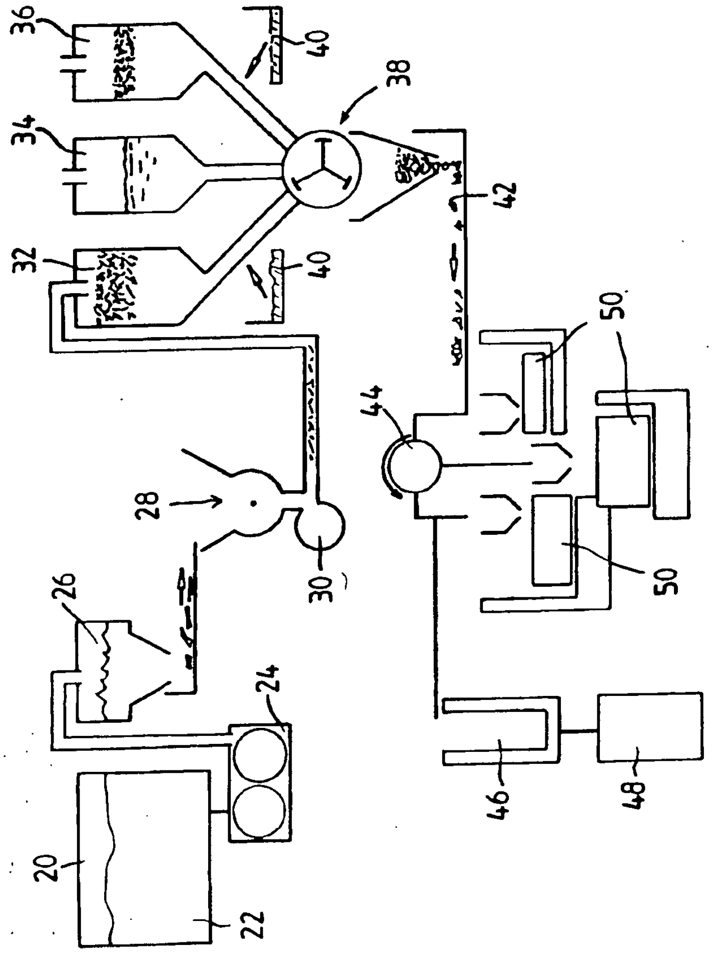
7. Process based on one of Claims 1 through 6, characterized by mixing in cork parts, preferably in the grain size of 2 to 8 mm.

8. Process based on Claim 8 [sic], characterized by the weight per unit volume lying between 300 and 1000, preferably between 700 and 900 kg/cm^3.

9. Process based on one of Claims 1 through 8, characterized by applying a thin, surface layer, especially a layer of polyurethane to the free surface of the carpet backing facing the textile side.

10. Backing for carpeting made of elastic, at least partly of foam-shaped material, characterized by its being comprised of decomposed waste carpeting with fiber lengths between two and thirty, preferably between five and fifteen millimeters and a polyurethane binder which is present in terms of weight in the amount from 5 to 30% with respect to the weight of decomposed carpet waste.

Attached 1 page of Drawings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